Section 5 Biotechnology “From making Biofuel to GM Crops”

1. Plant Biotechnology
   * 1. \_\_\_\_\_\_\_\_\_\_\_\_\_ is the process of moving \_\_\_ from one organism to another.
     2. When used in terms of \_\_\_\_\_\_ usually it means to take a \_\_\_\_\_\_\_ trait from one plant (wild) and \_\_\_\_\_\_ it to another plant (domestic).
2. Genetically Modified Crops (GM Crops)
   * 1. \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_ are crops in which \_\_\_ from one organism (usually) a different species) has been inserted into the crop to \_\_\_\_\_\_\_ it.
     2. “\_\_\_\_\_\_ \_\_\_\_” is an example of a GM crop.
     3. This rice grain contains two \_\_\_\_\_\_\_\_ \_\_\_\_\_ (giving it the yellow color) which helps the produce \_\_\_\_-\_\_\_\_\_\_\_\_ it would normally \_\_\_ be able to do.
3. The GM Tomato
   * 1. \_\_\_\_\_\_\_\_\_\_\_\_ made to this crop include:
        1. DNA from \_\_\_\_\_\_ \_\_\_\_\_\_ that is no longer sensitive to herbicide.
        2. DNA from \_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_ tobacco plants.
        3. DNA from other tomato plants whose \_\_\_\_\_ does not spoil quickly.
4. How GM Crops are Made
   * 1. The easiest way is through a \_\_\_\_\_ or \_\_\_\_\_\_\_\_\_ with the desired DNA. The virus or bacterium \_\_\_\_\_\_\_ the plant cell and the DNA are transferred, making them \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_.
     2. The other method, first used in \_\_\_\_, coats small \_\_\_\_\_ particles with the desired DNA and shoots them into the \_\_\_\_\_ \_\_\_\_.
5. Biomass
   * 1. Biomass is \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ from plants and/or animals that is used for energy (i.e. wood, \_\_\_\_ ).
     2. \_\_\_\_\_\_\_ can be found in all three physical phases: solid, liquid (gasohol), and gas (biogas). Solid biomass is what a large \_\_\_\_\_\_\_ of the world uses for energy today.
6. Gasohol
   * 1. Gasohol is a mixture of gasoline and \_\_\_\_\_\_\_.
     2. Ethanol is produced when microorganisms \_\_\_\_\_\_\_ sugar in sugar cane, corn, and grain into ethanol. This process is called \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_.
     3. While alcohol production from biomass is \_\_\_\_\_\_\_\_\_\_ it is not energy efficient. Large amounts of \_\_\_\_\_\_ are required to grow and harvest the crops. Then much of the original energy in the biomass is \_\_\_\_ in the conversion to alcohol.
7. Biogas
   * 1. Biogas is a \_\_\_\_\_\_\_ of gases that can be stored and transported \_\_\_\_ natural gas. When burned it produces \_\_\_\_\_ pollutants than coal or biomass.
     2. In China, biogas digesters use \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to decompose household and agricultural wastes to produce \_\_\_\_\_\_ that is used for heating and cooking. The solid remains are removed and used as \_\_\_\_\_\_\_\_\_\_.
8. Improving the Efficiency of Farming
   * 1. With the help of \_\_\_\_\_\_\_\_\_ images computers, which will be an \_\_\_\_\_\_\_\_\_ tool like the tractor, allow farmers to practice “\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_.”
     2. Precision Farming is knowing exactly how much \_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ different fields require to produce the \_\_\_\_\_\_\_ yield.
     3. It \_\_\_\_\_ time and money, \_\_\_\_\_\_\_\_\_ crop yields, and \_\_\_\_\_\_ nutrient run-off.